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PERFORMANCE OF WEANED RABBIT FED GRADED LEVELS OF AFRICAN YAMBEAN IN CASSAVA PEEL MEAL BASED DIETS.

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ABSTRACT
The effect of feeding varying levels of African yambean in cassava peal meal based diet was evaluated in a 12 week feeding trial. Thirty two (32) New Zealand white x Chinchilla crossbred weaned rabbits of about 8 weeks old mixed sexes were randomly divided into 4 treatment groups of 8 rabbits each in a completely randomized design. They were allotted to 4 different diets as follows: African yambean based diets, T1 (control 0%), T2 (10%), T3 (20%) and T4 (30%). The rabbits were housed individually in cages and supplied daily with feed and water *ad-libitum* under a mixed feeding regime where *Ipomea batatas* leaves was used as forage supplement. Results obtained from this study showed highly significant difference ($P<0.05$) in body weight gain, feed intake and feed conversion ratio. Results reveal the inclusion of African yambean up to 20% as protein source in cassava peel meal based diets for weaned rabbits without any adverse effect on performance.

KEYWORDS: African yambean, Cassava peel meal, New Zealand white, Chinchilla, Feed intake, Weight gain, Feed conversion ratio.

INTRODUCTION

The increasing demand for animal protein has encouraged greater interest in the production of fast growing animals with short generation interval. Domestic rabbit production which was neglected in the past has the potential of becoming an important source of meat protein (Anugwa *et al.*, 1982). In recent years interest in rabbit production in Nigeria has increased dramatically (Anya *et al.*, 2010). The potential of rabbit production in alleviating the low animal protein intake in Nigeria and other developing countries especially those in sub-Saharan Africa needs no emphasis (Amaefule *et al*., 2005). Moreso, there are no religious edicts preventing their production and consumption unlike pigs (Ayuk *et al.*, 2009).

The competition between man, animals and industries for conventional feed resources and the high cost of compounding concentrate and pelletised feed has been a major constraint militating against the increased production of valuable sources of animal protein (Animashaun *et al*., 2006; Ogunbajo *et al*., 2009).

With the constant threat of hunger/malnutrition in developing countries there is an urgent need to source for non-conventional or alternative feedstuffs within our respective localities for incorporation into the diets of our farm animals at least cost. Such alternative feedstuffs should not be in great demand as human food or having any industrial use and should be readily available and not subjected to the dictates of season (Agwunobi *et al.*, 2002; Agiang *et al.*, 2004). Two of such feedstuffs envisaged that appears to fit into this description are cassava peel and African yambean (AYB-*Sphenostylis stenocarpa*, Hochst. Ex A. rich) Harms. Cassava is abundantly produced and processed in Nigeria. Cassava peels account for between 10-13% of the whole cassava tuber by weight (Tewe *et al*., 1976). Nigeria is presently the largest producer of cassava in the world with about 50 million metric tonnes annually (FAO, 2008; Ogunjimi *et al*., 2010). However, this enormous feed resource is often discarded as waste and in most cases constitute environmental nuisance.

According to Moyib *et al*. (2008) little is known about the African yambean. This crop is cultivated for both tuber and seeds in tropical Africa, often grown with maize, yams and okra. AYB is classified as a minor grain legume

when compared to conventional grain legume like soyabean, cowpea, groundnut etc because it is under-exploited (Saka *et al.,* 2004). However, it is being neglected in most Nigerian homes for consumption because of long cooking hours and tedious manual removal of the skin coat (Ezueh 1984; Wokoma and Aziagba, 2001; Thomas *et al*., 2005). This unconventional legume can be effectively utilized as supplement to low-nitrogen crop residues such as cassava peel. This study therefore investigated the effect of feeding graded levels of AYB in cassava peel meal based diets on performance of weaned rabbits.

MATERIALS AND METHODS

Experimental Site: The study was conducted at the Rabbit Unit, Teaching and Research Farm, University of Calabar, Calabar, Cross River State.

Preparation and formulation of Experimental diets: The African yambean *(Sphenostylis stenocarpa)* seeds were procured from a local market in Obanliku Local Government Area, Cross River State. The bean seeds were boiled for 30 minutes following the method of Ukachuwku and Obioha (2000) for mucuna seed. Water was boiled to 100^0C in a large cooking pot before the seeds were poured in and allowed for 30 minutes before the water was drained off using a local basket. The seeds were then sun dried on aluminium roofing sheets for 3-5 days after which the seeds were milled, bagged and used in compounding the experimental diets. Cassava peels of TMS 30555 variety were obtained from students that cultivated cassava on the Crop Science Research Farm, University of Calabar. The peels were properly sun-dried for 4-7 days and regular turning was carried out to achieve even drying after which it was milled and used in compounding the experimental diets.

Management of experimental animals: Double tier hutches were used to house the rabbits, made of wood and wire mesh. The hutches and entire rabbitry were cleaned, washed and disinfected before the study commenced. A preliminary period of seven days was allowed for adjustment to experimental conditions before the study started. During this period, the rabbits were fed with a commercial growers mash from vital feed, some quantity of the test diets and *Ipomea batatas* leaves, dewormed with piperazine and a broad spectrum antibiotic (Samoxine) administered. Thirty two (32) New Zealand white x Chinchilla crossbred weaned rabbits of about 8 weeks old mixed sexes were used for the study. The rabbits were randomly allotted to four treatment groups with eight (8) rabbits per treatment balanced for weight in a completely randomized design experiment. Diet containing 0% AYB was formulated as the control diet (T1), while diets T2, T3 and T4 were formulated to contain 10%, 20% and 30% AYB meal respectively (Table 1). The experimental animals were fed with 0.4kg of experimental diet in the morning at 0800hrs and forages (*Ipomea batatas*) leaves in the evening at 1600hrs. Clean drinking water was provided free choice daily. Routine sanitary practices were carried out daily throughout the 12 week period of this study. Proximate composition of AYB and cassava peel and the experimental diets was carried out using standard methods (AOAC, 2000). Data obtained were analyzed using the analysis of variance (ANOVA) method of SPSS (2006) Inc. 15.0 Evaluation Version for windows. Significant mean levels were separated using Duncan Multiple Range Test as outlined in Obi (1990).

RESULTS AND DISCUSSION

The gross composition of experimental diets is presented on Table 1. 1% of salt was included in the diets because the bitter the taste of AYB, CPM and PKC could reduce palatability and consequently intake. The proximate composition (%) and energy content (ME kcal/kg) of experimental diet are presented on Table 2. The crude protein in the experimental diets range from 15.56 to 16.44 and the metabolisable energy levels in the study fall within the range of nutrient requirements for weaned rabbits as reported by Lukefahr (1992). The crude protein increased as the percentage of AYB increased from T2-T4. The reverse was the case for the energy levels; it decreased as the percentage of AYB increased from diets T2-T4. This result falls in line with the report of Okon *et al*. (2007) who observed the same trend in cocoyam diets for quail birds. Cassava peel has a very low crude protein of 3.22% which could reduce the total dietary crude protein content. However, the inclusion of AYB, a legume may have been responsible for the increased protein content as the percentage of inclusion increased from 10-30%. Thus diet T4 with 30% AYB inclusion had the highest (16.44%) CP content. Although the diets were formulated to provide adequate protein levels for growing rabbits, the determined crude protein for all diets (T1-T4) compared favourably with 16.00 – 18.00% reported by Lukefahr (1992) for growing rabbits.

The performance characteristics of weaned rabbits fed the experimental diets are presented on Table 3. The daily weight gain of rabbits increased progressively up to 20% level of inclusion of AYB and decreased thereof. The daily weight gain in this study was significantly ($P<0.05$) influenced by dietary treatment. This agrees with the results of Agwunobi *et al*. (2002) and that of Anya *et al.* (2010). It is therefore probable that the presence of antinutrients in AYB (Azeke *et al*., 2005) may have affected utilization at higher inclusion levels (beyond 20%) rather than energy since the dietary treatments were relatively equicaloric. Some anti-nutrients (tannins, phenols, trypsin inhibitors, alkaloids, phenols) are predominant in AYB like most other legumes (Ezueh, 1984; Azeke *et al*., 2005) and may have affected the bioavailability of nutrients and therefore production at the 30% level of inclusion. This agrees with the report of Ahamefule (2005) and Anya (2011) with pigeon pea and AYB respectively.

The final weight gain obtained in this study was however higher than that obtained by Agwunobi *et al*. (2000). The difference in results may be due to the fact that the legume (AYB) used in this study must have supplemented the low protein deficiency of cassava peel which resulted in higher weight gains.

The results of feed intake reported in this study is lower than that reported by numerous workers (Animashuan *et al*., 2006; Etuk *et al*., 2007; Iyeghe-Erakpotobor, 2010; Anya, *et al*., 2010). The depressed feed intake observed in this study could probably be due to the presence of antinutrients in AYB particularly rotenone, an alkaloid that is predominant in AYB (Sahu and Hameed, 1983; Santos *et al*., 1996; Hernandez-Infante *et al.*, 1998) thereby lowering palatability and intake as some of these anti-nutrients are known to cause irritation and throat burning. It is possible that sun-drying may not have effectively reduced considerably the level of anti-nutrients in cassava peel; moreso boiling of AYB for 30 minutes may not have been effective in completely detoxifying the legume of anti-nutrients, thus the observed difference in results obtained in this study.

There was significant ($P<0.05$) difference in the feed conversion ratio (FCR) of rabbits on diets T2 (10%) and T3 (20%) inclusion of AYB. FCR of rabbits on diets T1 and T4 were not significantly different ($P>0.05$). Feed cost per kg (₦) was not significantly different ($P>0.05$) with increasing levels of AYB inclusion in the respective diets. This agrees with earlier results of Etuk *et al*. (2007) and that of Anya *et al.* (2010). However, there was significantly ($P<0.05$) lower feed cost per kg weight gain for rabbits fed 10% (T2) and 20% (T3) levels of AYB inclusion. This report also agrees with that of Agwunobi *et al*. (2000), Etuk *et al*. (2007) and Anya *et al.* (2010). Some mortality occurred within the first week of the study (Table 3).

CONCLUSION

Results suggest that the optimum level of inclusion of AYB in cassava peel meal based diets should not exceed 20% in the finishing diet of broiler rabbits as there was no adverse effect on growth, weight gain and FCR at these levels of inclusion.

Table 1: Gross Composition of African yambean (AYB) in cassava peel meal (CPM) based diets.

Ingredients (%)	T1 0%	T2 10%	T3 20%	T4 30%
CPM	46	46	46	46
AYB	-	10	20	30
Wheat offal	33	23	13	3
PKC	18	18	18	18
Bone meal	2	2	2	2
Salt	1	1	1	1
Total	100	100	100	100
Calculated:				
Crude Protein	15.56	15.96	16.36	16.44
ME (Kcal/g)	3.41	3.38	3.29	3.26

Table 2: Proximate composition (%) and energy content (ME kcal/kg) of experimental diets, cassava peel meal (CPM) and African yambean (AYB).

Parameter (%)	T1	T2	T3	T4	CPM	AYB
DM	89.44	89.35	89.42	92.22	90.10	88.50
Crude Protein	15.51	15.91	16.31	16.38	3.22	22.10
Crude fibre	10.11	10.31	11.05	12.47	14.73	5.92
Ether Extract	4.50	4.61	4.80	4.94	0.91	7.55
NFE	48.92	49.35	48.59	49.88	65.65	47.65
Ash	10.35	9.12	8.62	8.49	5.57	5.28
GE (ME Kcal/kg)	3410.00	3380.00	3290.00	3260.00	-	-

Table 3: Performance characteristics of weaned rabbits fed the experimental diets.

Parameter	T1 0%	T2 10%	T3 20%	T4 30%
Initial live wt (g)	882.00	885.00	880.00	885.00
Final live wt (g)	1157.52	1396.51	1550.30	1297.44
Av. Wt. gain (g)	275.52	511.51	670.30	412.44
Daily Wt. gain (g)	3.28^{c}	6.09^{b}	7.98^{a}	4.91^{c}
Feed intake (g)	1607.70	1801.80	1890.00	1605.20
Daily feed intake (g)	19.14	21.45	22.50	19.11
FCR	5.84^{c}	3.52^{b}	2.82^{a}	3.89^{b}
Feed cost/kg (N)	80.75	85.75	90.75	95.75
Feed cost N/kg wt. gain	471.58^{c}	301.84^{ab}	255.92^{a}	372.47^{c}
Mortality (number)	1	-	-	2

Different superscript (a, b, c) within same row indicate significant ($P<0.05$) difference.

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